

REMARKS

The present application has been filed as a Continued Prosecution Application (CPA). Claims 1, 4 – 7, 10 – 13, 17, 18, and 21 - 23 are pending in the application. Claims 1, 7, 12 and 13 have been amended, and claims 21 – 23 are added by this amendment. Claims 14 – 16 and 19 – 20 directed to the non-elected invention have been canceled. In the office action dated June 16, 2000, Applicants were subject to a four-way restriction requirement: Group I, claims 1 – 13 and 17 drawn to a method of using an enzyme to modify a polyester; Group II, claims 14 – 16 drawn to a polyester article; Group III, claim 19 drawn to a method of determining the polyesterase activity of a biological material, and Group IV, claim 20 drawn to a kit. Applicants elected Group I. Claim 18, which is dependent on claim 1, was inadvertently omitted from the list of claims in the identified groups. Applicants submit claim 18 belongs with Group I, and has been maintained as a pending claim. Additionally, the previous rejections of the claims under 35 U.S.C. § 112, 2nd paragraph and §102(b) as being anticipated by Lund, JP 05344897, Enomoto, Peterson, EP 214,761, EP 476915 or Stewart was not maintained in the present Office Action, paper number 10.

Claim 1 has been amended to indicate that the method of modifying the aromatic polyester is directed to the surface of the polyester. Support may be found at least at page 1, line 10 and page 9, line 7 of the specification. Additionally the term "to" which was omitted from the phrase, "wherein said treatment occurs prior to the application of a finish ..." has been added. Further the property of "prilling prevention" has been added to the list of modified properties. It appears that said property, which was included in original claim 8, was inadvertently omitted from the list of properties in originally amended claim 1. Claim 7 has been amended to omit the second occurrence of "than". Claim 12 has been amended to 1) conform the language of the preamble to the language of steps (b) and (c) which recite "modifying"; 2) to include that the polyesterase enzyme is defined by either the UV assay or MB assay, and 3) to recite that the contacting occurs prior to the application of a finish. Claim 13 has been amended to depend from claim 1 as opposed to previously canceled claim 9.

Claims 21 and 23 are new independent claims. Claim 21 is directed to a method for enzymatically modifying the characteristics of an unsoiled aromatic polyester textile and support may be found at page 6, line 28 through page 7, line 2 of the disclosure. As stated at page 6,

"The purpose of this embodiment of the present invention is not to provide for a method of laundering stains from polyester fabrics, but instead, to provide for a mechanism to modify the textile

characteristics of a polyester comprising textile. Thus, in this embodiment of the invention, it is often advantageous to apply the polyesterase to textile products which are unsoiled, i.e. do not comprise stains which are typically subjected to commercial laundry detergents."

Claim 22 is dependent on claim 21 and is directed to a polyesterase derived from a *Pseudomonas* spp. Claim 23 is directed to a method for modifying the surface of an aromatic polyester resin, film, fiber, yarn or fabric wherein the polyesterase enzyme is derived from a *Pseudomonas* spp, and the polyesterase enzyme has at least 10% greater hydrolysis in an assay selected from a UV assay and a MB assay compared to a similar assay without the use of said polyesterase enzyme. Support is found in the original claims and at pages 6 and 9 of the specification.

Applicants would like to emphasize that while research in the area of improving the properties of polyester has been made with the use of enzymes, the work has focused on the ability of enzymes to degrade mono- and di-ester subunits. Applicants have discovered that a true polyesterase enzyme which has the ability to modify polyester according to the invention cannot be selected merely on its ability to hydrolyze mono- and/or-di-esters and must be selected using different criteria. (See page 3 of the specification). The polyesterases effective in the present invention will produce a positive result according to the UV Assay and/or the MB Assay. In a preferred embodiment, the polyesterase will produce a positive result in both assays which is at least double the increase in absorbance compared to a similarly treated sample without the polyesterase. As demonstrated in Example 1D, enzymes having esterase and/or lipase activity may be obtained from numerous sources and give a positive result in the DET assay (di-esterase activity). However, the results in the UV or MB assay indicate that only one of the tested enzymes had significant activity in both the UV and MB assay and would therefore be defined as a polyesterase according to the invention. As shown in this example, the prior art tests do not predict with accuracy whether such enzymes have activity against large repeating polymer fibers such as long chain polyesters.

The Examiner has rejected claims 1, 4 - 7, 10 - 13 and 17 under 35 U.S.C. §103 as being unpatentable over Lund et al., JP 05344897; Enomoto et al., Petersen, EP 214,761 or EP 476,915 taken with JP 52082774. Applicants respectfully traverse this rejection.

As previously argued, Lund discloses the chemical finishing of insoluble (primarily cellulosic) fibers which have appropriate exposed OH groups by reacting with carboxylic acids

or carboxylic acid esters in the presence of a lipase. Lund discloses nothing about modifying the surface of a polyester enzymatically and discloses nothing which relates to the "polyesterase" enzyme as claimed herein.

JP 05344897 (abstract) discloses that aliphatic polyesters are decomposed with a lipase. The abstract mentions nothing about aromatic polyesters and further provides no information regarding the "polyesterase" enzyme as claimed herein.

In response to Applicants' comments in the communication dated June 5, 2001, the Examiner has stated,

"Next, applicant argues Enomoto (US 4876024 and EP 214761) does not relate to the instant invention which relates to polyesters prior to the application of a finish.

Applicant is reminded that the use of a polyesterase prior to the application of a finish is obvious since one would want to first modify the polyester before applying any finish to it, thus allowing the enzyme to properly do its job."

Applicants stress Enomoto et al. (U.S. Patent No. 4,876,024 and EP 214 761) disclose the use of a lipolytic detergent additive for the purpose of cleaning soiled clothing. This process is intended for soiled, finished articles and does not reflect on the use of the presently claimed invention which relates to polyesters prior to the application of a finish and to the treatment of unsoiled polyester. There is no teaching or suggestion provided in the reference to suggest that a polyesterase enzyme as defined by Applicants should be used before applying a finish to a polyester. Additionally, there is no suggestion or motivation provided to suggest anything other than using a lipase in a detergent composition.

Peterson discloses the removal of hydrophobic esters such as oils, fats and waxes which build up on fabrics during processing. The fabrics to be treated are described in col. 1, line 60 et seq as "natural fibers with a residual content of naturally occurring triglycerides, e.g., native cotton . . . flax . . . and wool". Peterson does not relate to the treatment of polyester with a polyesterase as claimed.

EP 476 915 discloses a method of modifying a fabric surface by sorbing a lipase onto the surface. A fabric-lipase complex is formed and this complex is stable and hydrolytically active through subsequent drying and washing. The treated fabric has a lipase immobilized on the surface.

Applicants assert each of the above-cited references taken alone or in any combination fail to make obvious the claimed invention. While each of the above-cited references may, *arguendo*, disclose a part of the claimed invention, for example that a lipase may be used with a fabric, the references do not make obvious the invention as a whole.

The Examiner recognizes that the cited references do not individually render the claimed invention obviousness and cites the secondary reference JP 52082774 as providing motivation to use an aromatic polyester. Applicants assert there is no motivation provided in this reference in combination with the above-cited references to render the instantly claimed invention obvious. JP 52082774 (abstract) fails to fill the critical gap in the disclosures despite its reference to aromatic polyesters. This abstract requires that the polyester be ground into a fine fiber or powder to increase the surface area. The present invention concerns modifying the surface of a fiber, yarn or fabric and not decomposing that fiber, yarn or fabric.

It is a well known tenet of patent law that for a reference or combination of references to render a claimed invention obvious, there must be some teaching or motivation suggested by the references to make the claimed invention, and further there must be a teaching of a likelihood of success. Both the suggestion and the teaching of likelihood of success must be found in the prior art references. Applicants submit that neither the motivation to make the claimed invention nor the likelihood of success is found in the cited references whether taken alone or in any combination. Significantly, the references fail to teach or suggest a subclass of enzymes, i.e. polyesterase enzymes as defined in the specification by the UV or MB assay, could have a significant effect in modifying the surface properties of polyester and specifically the surface properties of an aromatic polyester.

Moreover, the combination of references do not suggest that using a polyesterase enzyme, as defined, would have had a reasonable expectation of success in producing:

1) a modification of the surface of an aromatic polyester wherein the aromatic polyester is treated prior to the application of a finish (as in claim 1);

2) a modification in the textile characteristics of a polyester wherein the polyester is treated prior to the application of a finish and the polyesterase enzyme has at least 10% greater hydrolysis in an assay selected from a UV assay or a MB assay compared to a similar assay without the use of said polyesterase enzyme (as in claim 12);

3) a modification of the characteristics of an unsoiled aromatic polyester textile wherein the polyester is treated prior to the application of a finish (as in claim 21); or

4) a modification of the surface of a aromatic polyester wherein the polyester is treated prior to application of a finish with a polyesterase enzyme solution derived from a *Pseudomonas* spp and the polyesterase enzyme has at least 10% greater hydrolysis in an assay selected from a UV assay and a MB assay compared to a similar assay without the use of said polyesterase enzyme.

For the reasons, as outlined above, Applicants respectfully request that the present rejection be withdrawn and that the claims be permitted to proceed to allowance.

Respectfully submitted,



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MARKED-UP VERSION OF AMENDED CLAIMS

1. (Twice Amended) A method for modifying the surface of an aromatic polyester resin, film, fiber, yarn or fabric comprising treating said polyester with a polyesterase enzyme for a time and under conditions to modify the properties of said polyester, wherein said treatment occurs prior to the application of a finish and said modified properties of said treated polyester **[comprise the] are selected from the group consisting of** pilling, prilling prevention, weight, feel, appearance and~~[/or]~~ luster properties of said polyester.

7. (Twice Amended) The method according to claim 6, wherein said polyesterase has at least 100% greater hydrolysis in a UV and/or a MB assay than [than] a similar method without the use of a polyesterase enzyme.

12. (Once Amended) A method for **[improving] modifying** the textile characteristics of a polyester article prior to the application of a finish to the article, comprising the steps of:

- (a) obtaining a polyesterase enzyme, wherein said polyesterase enzyme has at least 10% greater hydrolysis in an assay selected from a UV assay or a MB assay compared to a similar assay without the use of said polyesterase enzyme;
- (b) contacting said polyesterase enzyme with said polyester article under conditions and for a time suitable for said polyesterase to produce a modified polyester article; and
- (c) [produce] producing** a modified polyester article.

13. (Once Amended) The method according to [claim 9] claim 1, wherein said polyester **[article comprises a fiber, yarn or fabric and said]** fiber, yarn or fabric is subsequently incorporated into a textile.